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ABSTRACT

Creation of a computer-based interactive television system appears to have strong potential for instruction demanding motion, and for individualized instruction. If upon creation it does prove to have significant effect many questions will be raised, such as: How does effective development occur? What TV production techniques are most effective and efficient? And, What CAI production techniques are most effective and efficient? (Author/VT)

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Description of a Computer-Based, Interactive, Instructional Television System Prototype

by

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April 21, 1977

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We believe that an interactive, random access device which can provide the elements of computer-assisted instruction and instructional television will provide instructional gains for concepts requiring motion that cannot be done currently by another means. Since no such system exists we have set out to design, build and test a prototype.

Questions To Be Addressed

1. Is it possible to build a system which incorporates the elements of interactive CAI and instructional television for use in a learning center?

2. What is the learning effect of such a system (if it is possible)?

3. Can such a system be used as a research instrument?

Rationale

There are several factors which have led us to conclude that this prototype should be built and tested.

1. Significant instructional gains have been documented as a result of drill and practice provided through interactive, individualized computer-assisted instruction.

2. Significant reductions in student time required to reach mastery have occurred through using CAI.

3. Instructional television is an excellent media to portray motion with audio.

4. Television replay systems have the potential for controlled redundancy through random access.

5. Individual needs can be diagnosed and provided by combining elements of CAI.

6. Computer based management and research capacity can be employed as instruction progresses.

The Two Elements: TV and CAI

A) Television

Television, with its simultaneous audio capacity is an excellent way of representing concepts which require movement. The subtle flow of action can be shown in real time highlighted in color. TV can provide these critical visual experiences in portable form by using cassettes or cartridge. When motion is critical, training must occur with the real experience or with a televised representation. In many cases TV is more practical and lower cost than teaching under "real" circumstances.

B) Computer-Assisted Instruction

Interaction, data collection, diagnosis, prescription and reinforcement describe CAI. Unique individualized instruction is tailored for each student. Sufficient practice provides skills at mastery

level. Since the computer is the media upon which CAI is based, related capacities can be employed such as student performance summaries and course evaluation. The computer can also be a controller of other media such as a VTR (Video Tape Replay).

Combined CAI and TV

Combining the elements of CAI and TV should provide a new dimension of instructional possibilities. TV would be enriched by the process of interaction making it an "active" learning experience. CAI will be enriched as the information presentation will be expanded to include motion with simultaneous audio. This new system will include all of the computer-based capacities for individualizing instruction, student performance recording and research. It will include all television capacities with controlled random access. The prototype will also include special features which will allow research of specific variables.

Computer-Assisted Instruction/Instructional Television Prototype

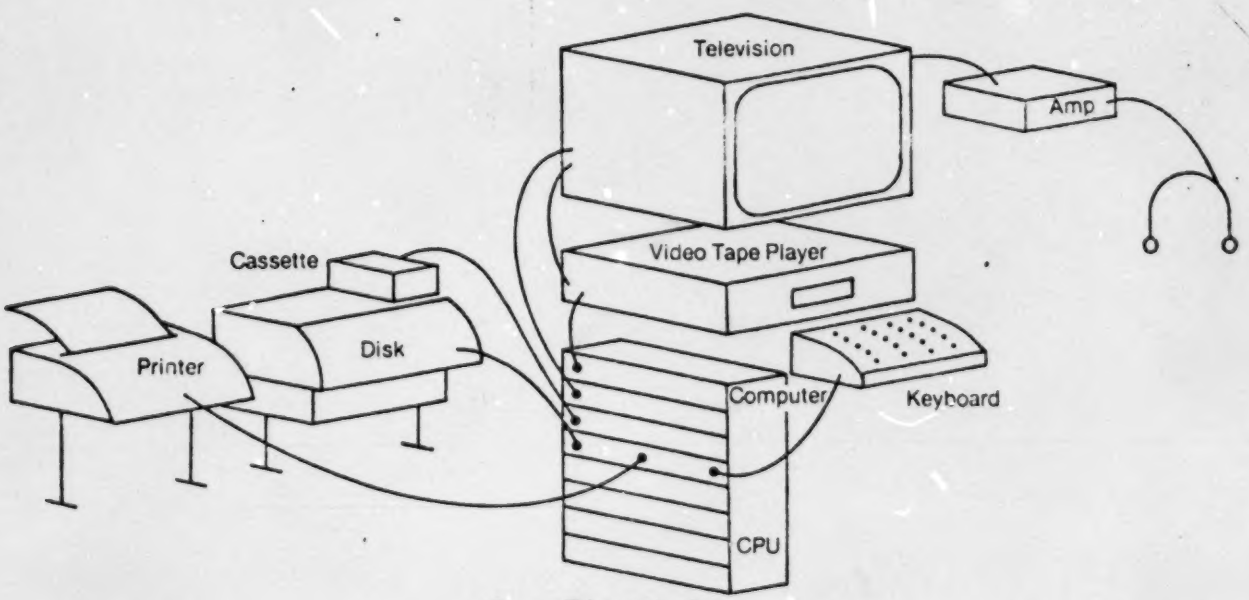

Figure 1

Instructional Use

Instructional demands in a learning center require that the prototype demonstrate reliability as well as the ability to provide instruction. A projected instructional event would include the following sequence of activities:

1. A student sits down at a learning station including keyboard, Color TV and VTR (see figure 1).

2. The student signs onto a lesson which has been assigned by a teacher.

3. Information about the unit of instruction and which TV tape to load is displayed on the TV set.

4. The student begins the lesson. A pretest sequence (motion with audio) is given followed by tutorial or appropriate drill; i.e., CAI is interspersed with Motion/Audio.

5. The student responds to questions.

6. The computer analyzes the student's response and based on performance he will be given a unique set of instructions with immediate feedback.

7. Student control of review, problem solving practice and quiz-taking would follow a unit but precede a proof section (post-test).

8. Non mastery of the posttest would again formulate an individualized set of instruction based on the student's responses. Reaching mastery would automatically exit the student from the lesson. Scores would be presented to the student.

9. Student data is collected as he goes through the course. Summaries of the student's progress (pretest scores, quiz scores, completion, etc.) would be available upon demand by the student's teacher. The days the student was on the program and time used will be included.

10. A summary of all of the class data will be available.

11. A summary of student's paths and other data will be available to evaluate the effectiveness of the courseware (programmed instruction).

Research Use

Research use of the prototype can focus on several different problems such as instructional stimuli variables, student learning characteristics or perhaps formative and summative course evaluation. To be effective as a tool for research, various display capacities of the CAI/TV system must be controlled. Examples:

1. video with simultaneous audio
2. video without audio
3. audio without video
4. random access to video segments
5. CAI display and interactive capacity

The inclusion of "interactiveness", random access and other features of this system will allow research into the effectiveness of instructional TV production and individualized CAI strategies to mention but two.

Summary

Creation of a computer-based interactive television system appears to have strong potential for instruction demanding motion and individualized instruction. If upon creation it does prove to have significant effect many questions will be raised. Some questions would be: "How does effective development occur? What TV production techniques are most effective and efficient? And, what CAI production techniques are most effective and efficient?

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